



A new genus and two new species, one extant and one fossil, in the family Troctopsocidae (Psocodea: ‘Psocoptera’: Troctomorpha: Amphientometae: Electrentomoidea)

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Abstract

We describe a new genus, *Troctopsocoides*, in the family Troctopsocidae with two new species, *T. erwini* n. sp. (Madre de Dios, Peru) and *T. gracilis* n. sp., a fossil in amber from the Dominican Republic. We include a diagnosis of the family Troctopsocidae following a recent important change in its status and a key to the known genera of the family.

Key words: new genus, new species, Peru, Dominican Republic, amber fossil

Introduction

The family Troctopsocidae is a small group of psocids known only from the American and Asian tropics. The family, originally recognized by Roesler (1940), who gave it the preoccupied name Plaumanniidae, was given its present name, with addition of several genera by Mockford (1967). Smithers (1972) recognized the set of included genera as constituting two subfamilies, Troctopsocinae and Protroctopsocinae, and, following the addition of several more genera (Lienhard 1988; Lienhard & Mockford 1997) Lienhard & Smithers (2002) raised these subfamilies to families.

In the present paper, we describe a new genus and two new species in Family Troctopsocidae. One of the new species is an extant form from western Amazonian Peru, and the other is a fossil from the Dominican Republic amber. We include a diagnosis of the family, a key to the known genera, and a brief biogeographic discussion.

Material and methods

The material consists of the single type specimen of *Troctopsocoides erwini* n.sp., and the single type specimen of *Troctopsocoides gracilis* n.sp., the latter a fossil in amber. The type of the former will be deposited in the United States National Museum collection, Washington, D. C. That of the latter will be placed in the Paleontology Collection of the Illinois Natural History Survey, Champaign, Illinois.

Illustrations were made with the use of a drawing tube. Orientation of figures follows Mockford (1993). Measurements, expressed in µm, were made with a filar micrometer. Color descriptions are based on observations through a dissecting microscope with direct light. The color of the fossil is probably affected by the moderately strong amber color of the surrounding medium.

Abbreviations, other than the standard ones for wing veins, are explained as follows: BL= body length; for head: d= distance from innermost to outermost point on compound eye in anterior or dorsal view (see Mockford 1989, Fig. 1); D= greatest antero-posterior diameter of compound eye in dorsal view; fn= a specific antennal flagellomere (f1-f4) and its length; IO= least distance between compound eyes in anterior or dorsal view; Pn= a particular segment, 1–4, of the maxillary palpus; for legs: F= hind femur length; T= hind tibia length; t1-t3= first to third hind tarsomeres and their lengths, measured condyle to condyle; for the ovipositor: v1= the large first valvula,

arising separately on its tergite; v2= the second valvula, pointed distally and with base fused to v3; v3= the large, plate-like third valvula, slightly bilobed distally; for wings: FW=forewing length; HW= hindwing length.

Systematics

Family Troctopsocidae (revised status: Lienhard & Smithers 2002)

Diagnosis. Antennae 11–13 segmented. Wings usually membranous (elytriiform only in females of the genus *Coleotroctellus* Lienhard). Pterostigma open basally. Tarsi 3- segmented, claws of each foot equal or not. Front tibia with or without a longitudinal comb of short, stout setae. Third valvula at least slightly bilobed apically, usually strongly so. Phallosome U-, V-, or Y-shaped, open distally.

Key to the genera of Troctopsocidae

1. Head somewhat flattened, with vertex nearly sharp-edged. Sc in forewing joining R1 . . . *Selenopsocus* Lienhard & Mockford
- . Head normal. Sc in forewing ending in R stem, costa, or membrane 2
2. First segment of Rs in hindwing present. Pretarsal claws: anterior claw of each foot foliose, setose, terminating in a hook; posterior claw slender, curved, untoothed, bearing a long basal seta bent at its apex (see Mockford 1967, Figs 50, 51) 3
- . First segment of Rs in hindwing absent. Pretarsal claws not as above, the two claws of each foot equal 4
3. In forewing, Cu loop joined to vein M3 by a crossvein. T-shaped sclerite present *Troctopsocus* Mockford
- . In forewing, Cu loop free. T-shaped sclerite absent *Troctopsocopsis* Mockford
4. Forewings markings consisting of broad banding or forewings elytriiform (females of *Coleotroctellus* Lienhard), in some cases uniformly dark in color. In hindwing, vein R4+5 directed distally 5
- . Forewings markings consisting of scattered small spots (Figs 1, 11). In hindwing, vein R 4+5 directed postero-distally (Figs 2, 12) *Troctopsocoides* n.gen.
5. Antennae 13-segmented. Female forewings elytriiform, those of male normal *Coleotroctellus* Lienhard
- . Antennae 11-segmented. Forewings of both sexes not elytriiform 6
6. First antennal flagellomere longer than second and third together. Female subgenital plate with four stout setae at apex *Thaipsocus* Lienhard & Mockford
- . First antennal flagellomere approximately equal to second in length. Female subgenital plate without stout setae at apex *Troctopsoculus* Mockford

Troctopsocoides n.gen.

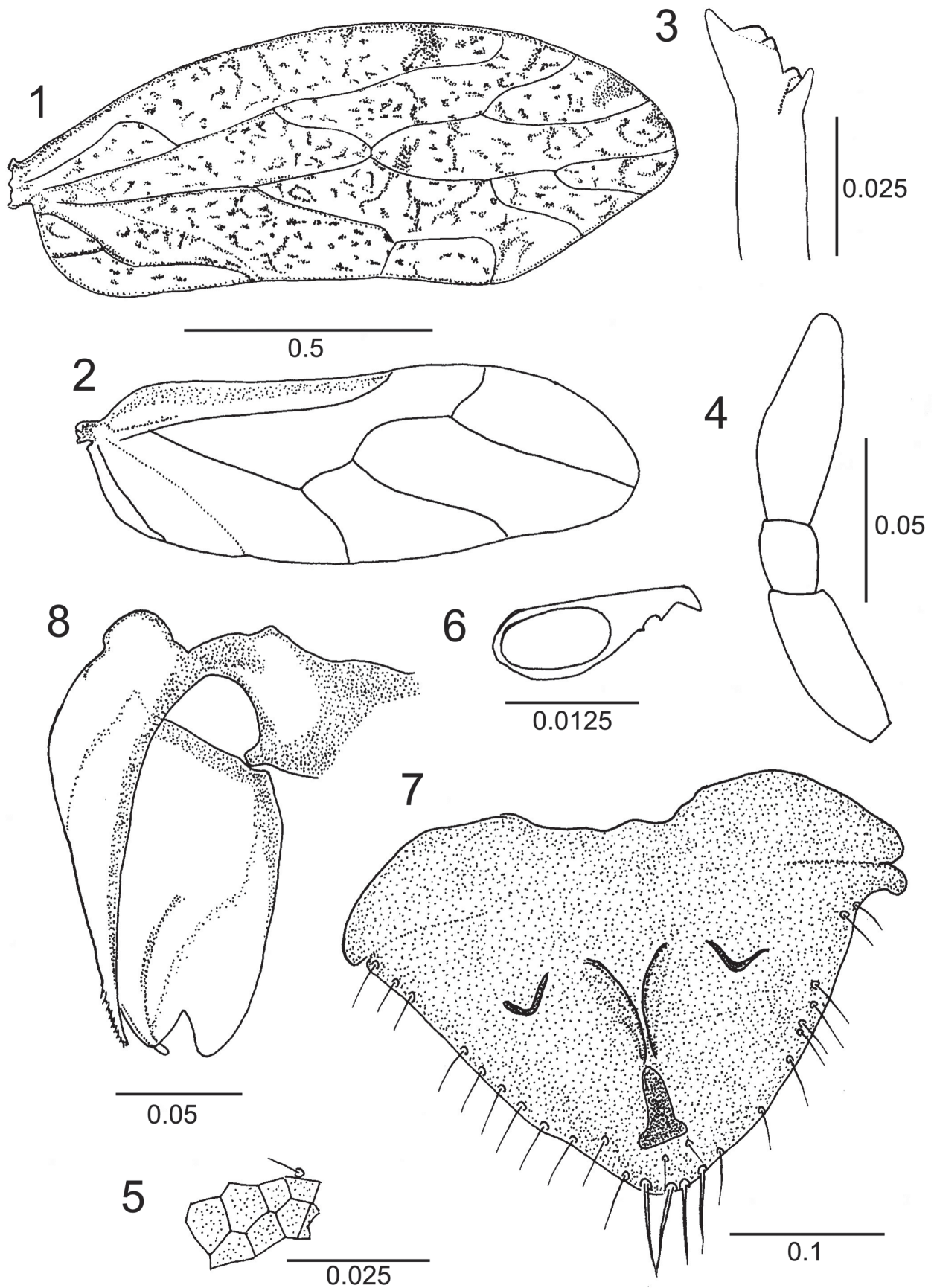
Diagnosis. With the characters of family Troctopsocidae. Differing from all other genera of the family in postero-distal (instead of distal) orientation of vein R4+5 in the hindwing (Figs 2, 12). Antennae 13-segmented; f1 approximately equals f2 in length. P2 straight and somewhat thickened; P4 bullet-shaped (Fig. 4). Wings membranous; forewing with scattered spots, some tending to form transverse lines (Figs 1, 11); first segment of vein Rs in hindwing absent. Fore tibia and fore t1 lacking longitudinal row of stout setae; pretarsal claws of each foot structurally equal, each with a major (outer) and minor (inner) preapical denticle (as in Fig. 6). Subgenital plate triangular (Figs 7, 13). See also the generic key.

Structures visible on the extant, but not in the fossil species: subgenital plate with four stout apical setae; T-shaped sclerite present, with short arms (Fig. 7); in ovipositor valvulae, v2 and v3 fused in basal half; v3 only moderately bilobed at apex.

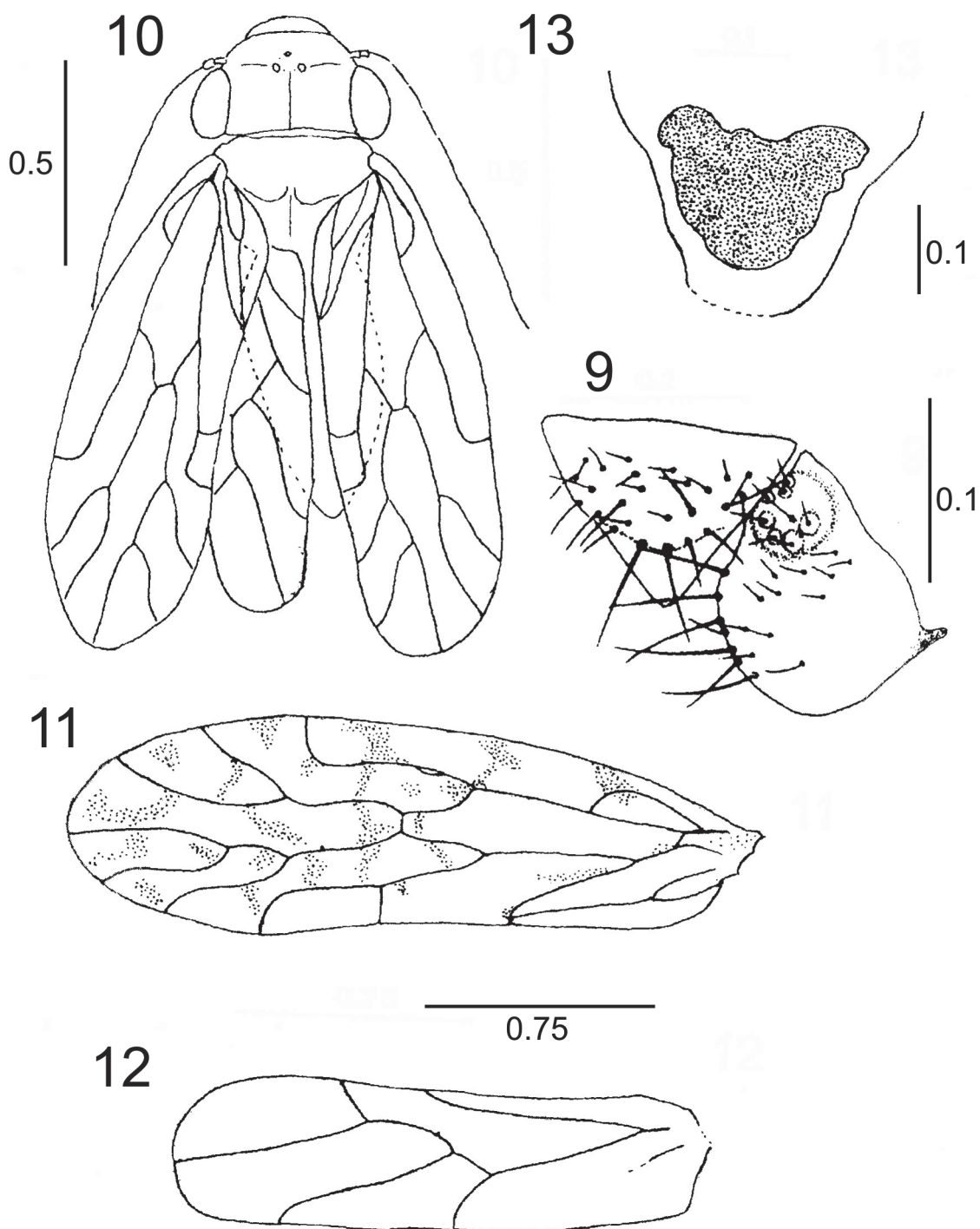
Type species. *Troctopsocoides erwini* n.sp.

Troctopsocoides erwini n.sp. (female)

Color (in 80% ethanol, ca. 12 years). Body pale brown. Compound eyes reddish, ocelli hyaline. Legs brown, with distal ends of femora white, proximal and distal ends of tibiae and of each t1 white, t2's pale brown, t3's brown. Forewing (Fig. 1) with many small, brown spots. Hindwings (Fig. 2) slightly shaded.



FIGURES 1–8. *Troctopsocoides erwini* n. sp. Female. 1. Forewing. 2. Hindwing. 3. Lacinial tip. 4. P2-P4 of maxillary palpus. 5. Sculpture of vertex, parietal region. 6. Pretarsal claw. 7. Subgenital plate. 8. Ovipositor valvulae. Scales in mm.



FIGURES 9–13. *Troctopsocoides* spp. Structures. 9. *T. erwini* n. sp. Female, epiproct and right paraproct. Figs 10–13. *T. gracilis* n. sp. Female. 10. Habitus, dorsal view, legs not shown. 11. Forewing. 12. Hindwing. 13. Subgenital plate. Scales in mm.

Structural characters. Sculpture of integument in vertex and frons (Fig. 5) a polygonal net formed by irregular pentagons and hexagons with granulate surfaces. Lacinal tip (Fig. 3) with inner cusp pointed and outer cusp with a subapical, rounded protuberance. Maxillary palpus (Fig. 4 of segments 2-4): P2 straight, somewhat thickened, P4 bullet-shaped. Pretarsal claws (Fig. 6) each with a large preapical denticle and a minute more basal denticle. Forewing (Fig. 1) broad in middle, tapering beyond a line from distal end of pterostigma to distal end of areola postica to form a slenderer apical region. Rs-M junction in forewing a short crossvein; other aspects of wing venation typical of the family or as described in the generic diagnosis. Subgenital plate (Fig. 7) triangular, rounded

apically, with a partial division (segmental?) near base; apex with four stout setae; other marginal setae shorter (non-marginal setae not shown); in middle, two curved lines running lengthwise, basal to T-shaped sclerite and a smaller crescent-shaped line on each side of the long lines; T-shaped sclerite stout with short arms; surface of plate basal to dashed line in Fig. 7, sculptured with a net of slender, transverse imbrications becoming compressed to longitudinal lines, as illustrated, near base. Ovipositor valvulae (Fig. 8): v1 large, reaching nearly to tip of v2+3; v2 fused with v3 in basal two-thirds; v3 shallowly bilobed apically. Paraprocts (Fig. 9): semicircular, sensory fields each with four trichobothria and four setae with faintly developed basal rosettes. Epiproct (Fig. 9): triangular, with two macrosetae near apex; setae of paraprocts and epiproct as illustrated.

Measurements (μm). FW: 1273, HW: 1088, F: 208, T: 368, t1: 199, t2: 44, t3: 49, P4: 63, f1: 55, f2: 53, f3: 58, f4: 58, f5: 59, f6: 62, f7: 49, f8: 46, f9: 62, f10: 56, IO: 205, D: 112, d: 75, IO/D: 1.83, PO: 0.66.

Etymology. The species is named for Dr. Terry L. Erwin, leader of the Smithsonian Institution Canopy Fogging Project, in the Río Tambopata Reserved Zone, in which this species, and many others, were collected.

Specimen studied. Holotype female. PERU. Madre de Dios. Río Tambopata Reserved Zone. 30 km (air) SW Puerto Maldonado, elevation 290 m. 12°50'S: 69°17'W. 4.V.1984. T. L. Erwin-*et al.* (Smithsonian Institution Canopy Fogging Project). Deposited in the Smithsonian Institution Collection, Washington, D. C.

Troctopsocoides gracilis n.sp. (female)

Diagnosis. With the characters of the genus. Differing from *T. erwini* by slenderer wings, fewer and mostly larger spots in forewing, and longer Rs-M crossvein in forewing.

Color. Body in general gray. Compound eyes gray with slight reddish tinge. Antennae and legs brown. Forewings extensively marked with brown spots (Fig. 11). Hindwings clear, unmarked (Fig. 12). Wing veins dark brown. Subgenital plate (Fig. 13) dark brown.

Structural characters. Habitus (Fig. 10). Antennae about two-thirds length of body. Median ecdysial line of head distinct, extending to ocellar field. Surface of vertex granular. P2 apparently straight (not clearly visible in its entirety). P4 apparently same shape as in *T. erwini* (Fig. 4). Pretarsal claws of a foot equal in shape and size, apparently of same structure as in *T. erwini*. Subgenital plate (Fig. 13) bell-shaped, darkly pigmented, appearing very rigid.

Measurements (μm). BL: 1155, FW: 1427, HW: 1161, Antenna (approximate): 820, IO: 233, D: 119, IO/D: 1.96, d: 78, IO/d: 2.99.

Etymology. The specific name refers to the slender wings of this species.

Specimen studied. Holotype female. Dominican Republic. Samaná Province (northern mountains). Los Cacaos, amber inclusion, probably Miocene (see Grimaldi & Engel 2005). The type will be deposited in the Paleontology Collection of the Illinois Natural History Survey, Champaign, Illinois, USA.

Discussion

The family Troctopsocidae gives the impression of retaining many plesiomorphic states of characters. It is represented by two non-overlapping sets of small genera, one in the American tropics and the other in the southeast Asian tropics. In the American tropics, the genus *Troctopsocopsis* occurs in several of the Antillean islands, but the species are rare wherever they occur (personal observations of ELM). On the continents, the genera *Troctopsocus*, with three species, and *Troctopsoculus*, with two species, occur in wet tropical forests. The species also tend to be rare (personal observations of ELM), although some are widely distributed. Currently, none of these genera are known from both the Antilles and the mainland. *Troctopsocoides* will be an exception if it proves to still exist in the Antilles.

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specimens of Psocoptera collected by the Smithsonian Institution Canopy Fogging Project, at the Río Tambopata Reserved Zone, Madre de Dios, Peru, among which was found the type of *T. erwini*. ANGA thanks Instituto de Biología, Universidad Nacional Autónoma de México, for continuous research support.

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